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Test 510: Massey-Harris 44 Special

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The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: October 10 to October 24, 1953
Manufacturer: THE MASSEY-HARRIS COMPANY,
RACINE, WISCONSIN
Manufacturer's rating: Not rated.

NEBRASKA TRACTOR TEST NO. 510

MASSEY-HARRIS 44 SPECIAL

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury		
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air			
* TEST B—100% MAXIMUM LOAD—TWO HOURS										
48.95	1351	4.302	11.38	0.539	0.00	161	57	29.037		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
45.23	1349	3.630	12.46	0.493	0.00	163	66	29.090		
TEST D—RATED LOAD—ONE HOUR										
42.81	1350	3.469	12.34	0.497	0.00	171	77	29.100		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
42.76	1349	3.456	12.37	0.496	...	173	80	.....	
1.51	1455	1.154	1.31	4.689	...	153	80	.....	
22.66	1425	2.342	9.68	0.634	...	158	82	.....	
43.16	1301	3.446	12.52	0.490	...	177	82	.....	
11.45	1437	1.657	6.91	0.888	...	152	82	.....	
33.19	1396	2.957	11.22	0.547	...	165	84	.....	
25.79	1394	2.502	10.31	0.595	0.00	163	82	29.103		
TORQUE (At Dynamometer)										
Eng rpm	1352	1276	1199	1128	1048	968	876	827	765	682
Lb-ft	284.4	289.1	293.1	295.9	301.7	308.9	303.6	299.3	294.4	308.7

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cool- ing med	Air	
TEST F—100% MAXIMUM LOAD—3rd Gear											
43.58	3749	4.36	1353	6.86	.....	Not Recorded	.....	.....	153	74	28.820
TEST G—OPERATING MAXIMUM LOAD											
27.69	5341	1.94	1353	16.61	.....	Not Recorded	.....	.....	128	53	29.170
40.52	4822	3.15	1350	10.33	.....	Not Recorded	.....	.....	150	72	28.820
41.63	3569	4.37	1351	6.49	.....	Not Recorded	.....	.....	150	72	28.820
41.59	2693	5.79	1353	4.73	.....	Not Recorded	.....	.....	143	71	28.840
35.48	1049	12.68	1350	2.22	.....	Not Recorded	.....	.....	146	70	28.850
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
34.71	2948	4.41	1349	5.34	3.137	11.06	0.555	0.00	129	59	29.104
TEST J—OPERATING MAXIMUM LOAD—3rd Gear											
35.66	3346	4.00	1351	15.00	.....	Not Recorded	.....	.....	120	49	29.060
TEST K—OPERATING MAXIMUM LOAD—3rd Gear											
32.40	3138	3.87	1354	15.52	.....	Not Recorded	.....	.....	130	53	29.020

TIRES, WHEELS AND WEIGHT

	Tests F, G & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	616 lb each	None	None
Added cast iron	700 lb each	None	None
Rear tires			
No. and size	Two 14-30	Two 14-30	Two 13-30
Ply	6	6	6
Air pressure	14 lb	12 lb	12 lb
Front wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 7.50-16	Two 7.50-16	Two 7.50-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	18 inches	19 inches	18 inches
Static weight			
Rear end	6385 lb	3754 lb	3650 lb
Front end	1852 lb	1860 lb	1852 lb
Total weight as tested with operator	8412 lb	5789 lb	5687 lb

FUEL, OIL and TIME Gasoline octane No ASTM 76 Research 82 (rating taken from oil company's typical inspection data); weight per gallon 6.137 lb OIL SAE 10; to motor 1.962 gal; drained from motor 1.676 gal; Total time motor was operated 48 hours.

CHASSIS TYPE Standard Serial No 44G1SF 50001 Tread width rear 57½" front 53½" Wheel Base 87½" Hydraulic control system direct engine drive Advertised speeds mph first 2.24 second 3.39 third 4.50 fourth 5.85 fifth 12.50 reverse 2.95 Belt pulley diam 13½" face 67/16" rpm 863 Belt speed 3050 fpm Clutch dry disc operated by foot pedal Seat pressed steel on coil spring with shock absorber Brakes internal expanding shoe operated by 2 foot pedals Equalized by locking 2 pedals together Power take-off standard type.

ENGINE Make Massey-Harris Type 4 cylinder vertical Serial No MHL 277G 1007 Crankshaft mounted lengthwise Head I Lubrication Pressure Bore and Stroke 4" x 5½" Rated rpm 1350 Compression ratio 6.25 to 1 Displacement 277 cu in Port Diameter Valves Inlet 15/16" Exhaust 15/16" Governor centrifugal variable speed Carburetor Size 1¼" Ignition System battery Starting System 6 volt battery Air Cleaner oil washed wire screen Muffler was used Oil Filter replaceable paper element Cooling medium temperature control thermostat.

REPAIRS AND ADJUSTMENTS: Gear shift lever broke at welded joint following Test H.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with carburetor set for 100% maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J & K were made with an operating setting of the carburetor (selected by the manufacturer) of 93.0% of maximum belt horsepower.

HORSEPOWER SUMMARY

	Draw- bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92 HG)	45.85	50.29
2. Observed maximum horsepower (tests F & B)	43.58	48.95
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	34.39	42.75

We, the undersigned, certify that this is a true and correct report of official tractor test No. 510.

L. F. LARSEN
Engineer-in-Charge

C. W. SMITH
L. W. HURLBUT
F. D. YUNG
Board of Tractor
Test Engineers

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is held wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors, which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads of 20 minutes each: rated load, no load, $\frac{1}{2}$ rated load, maximum load at wide open throttle valve, $\frac{1}{4}$ and $\frac{3}{4}$ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling

so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.

